

NO SCALE

**LEGEND**

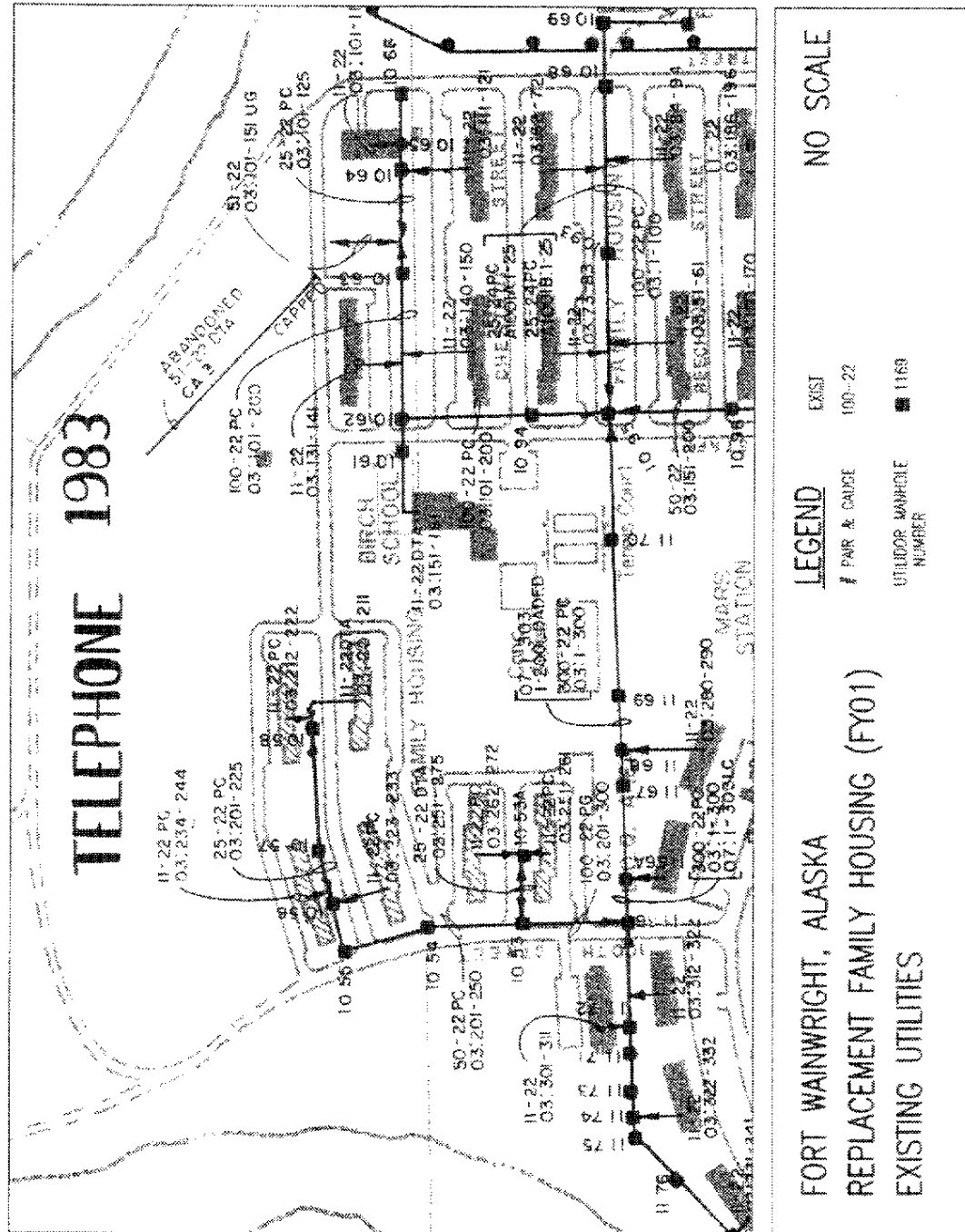
PIPE SIZE (INCH)  
15"

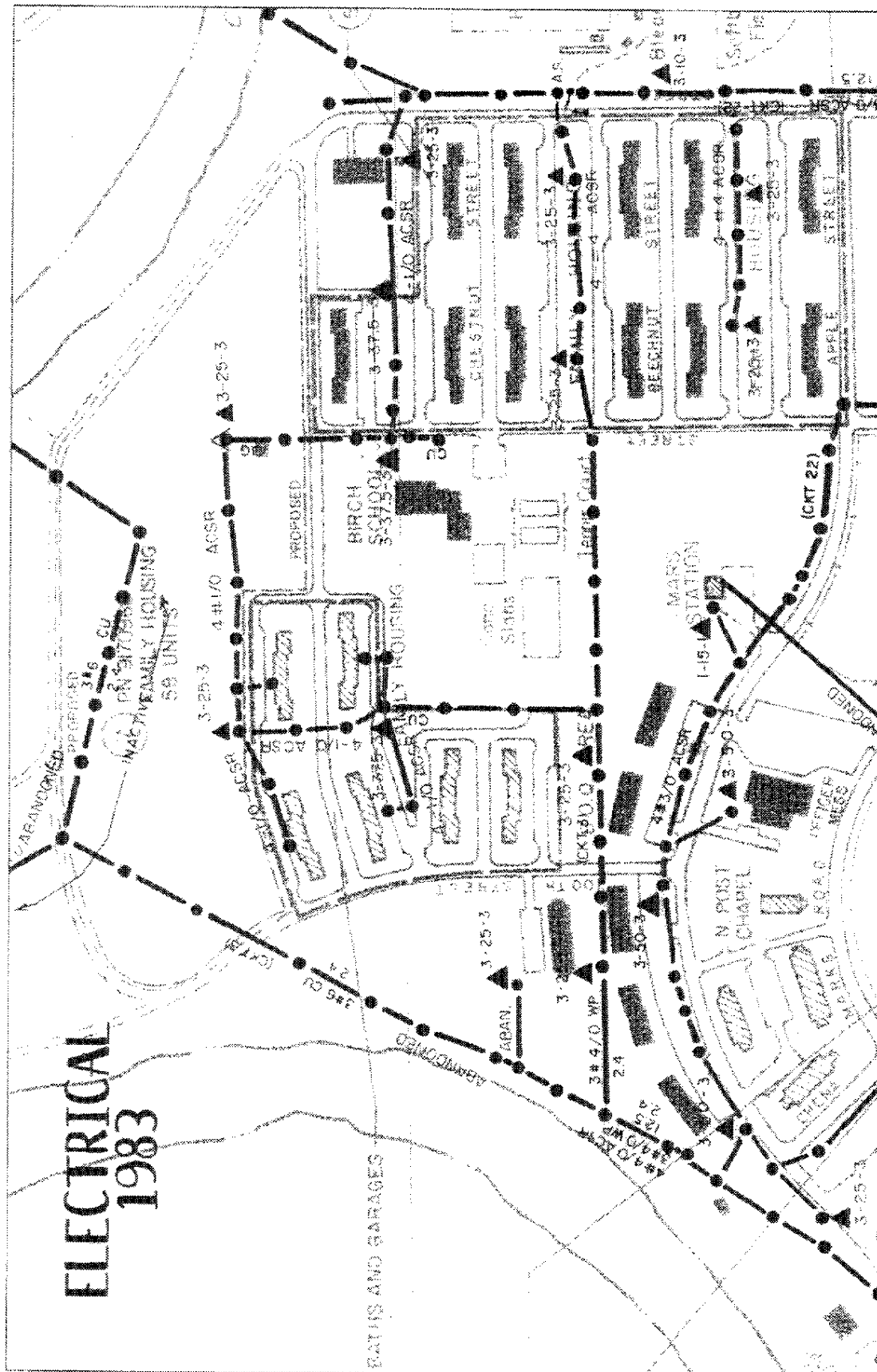
DIRECTION OF FLOW

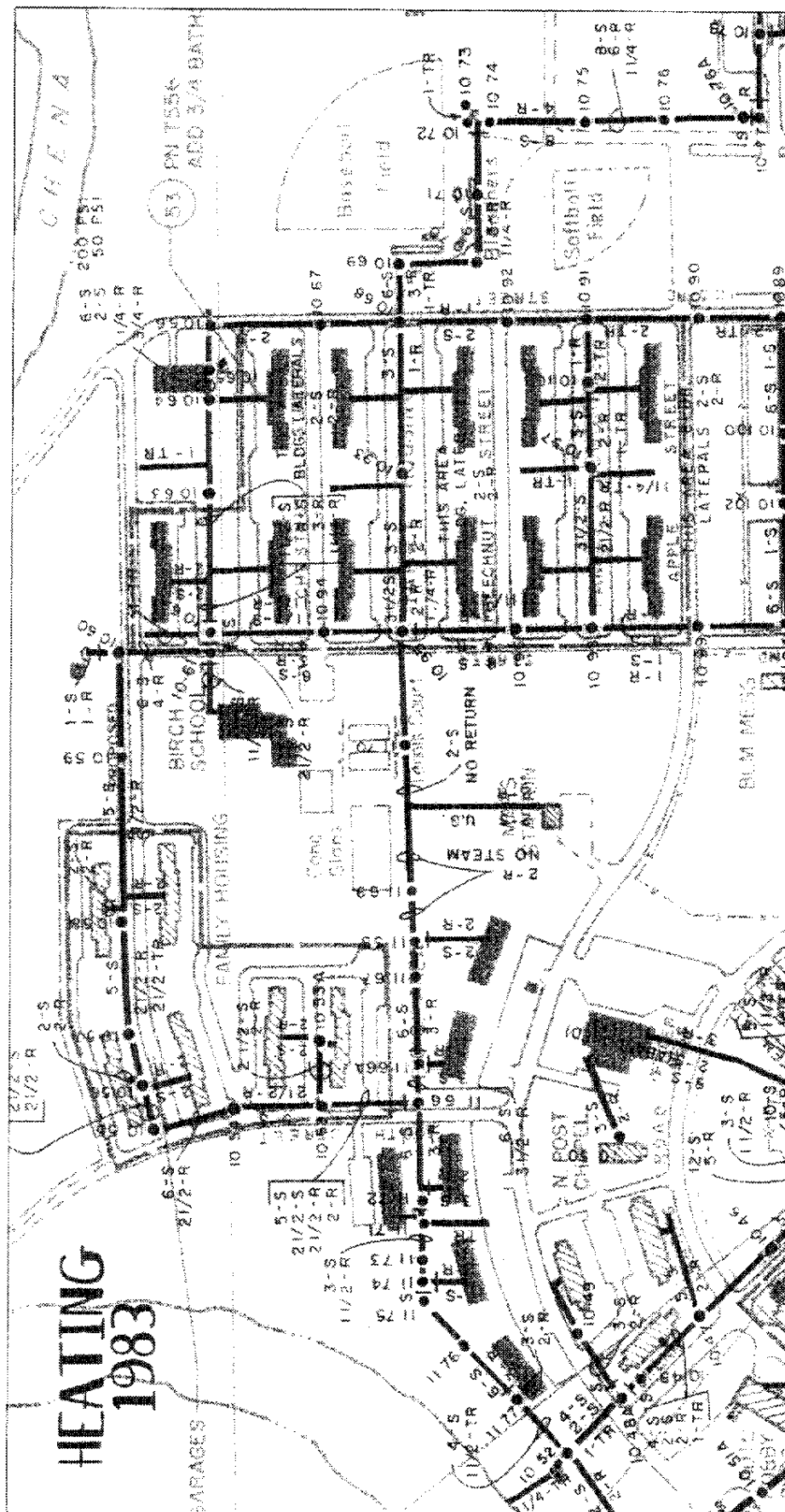
CURB INLET

FORT WAINWRIGHT, ALASKA  
REPLACEMENT FAMILY HOUSING (FY01)  
EXISTING UTILITIES









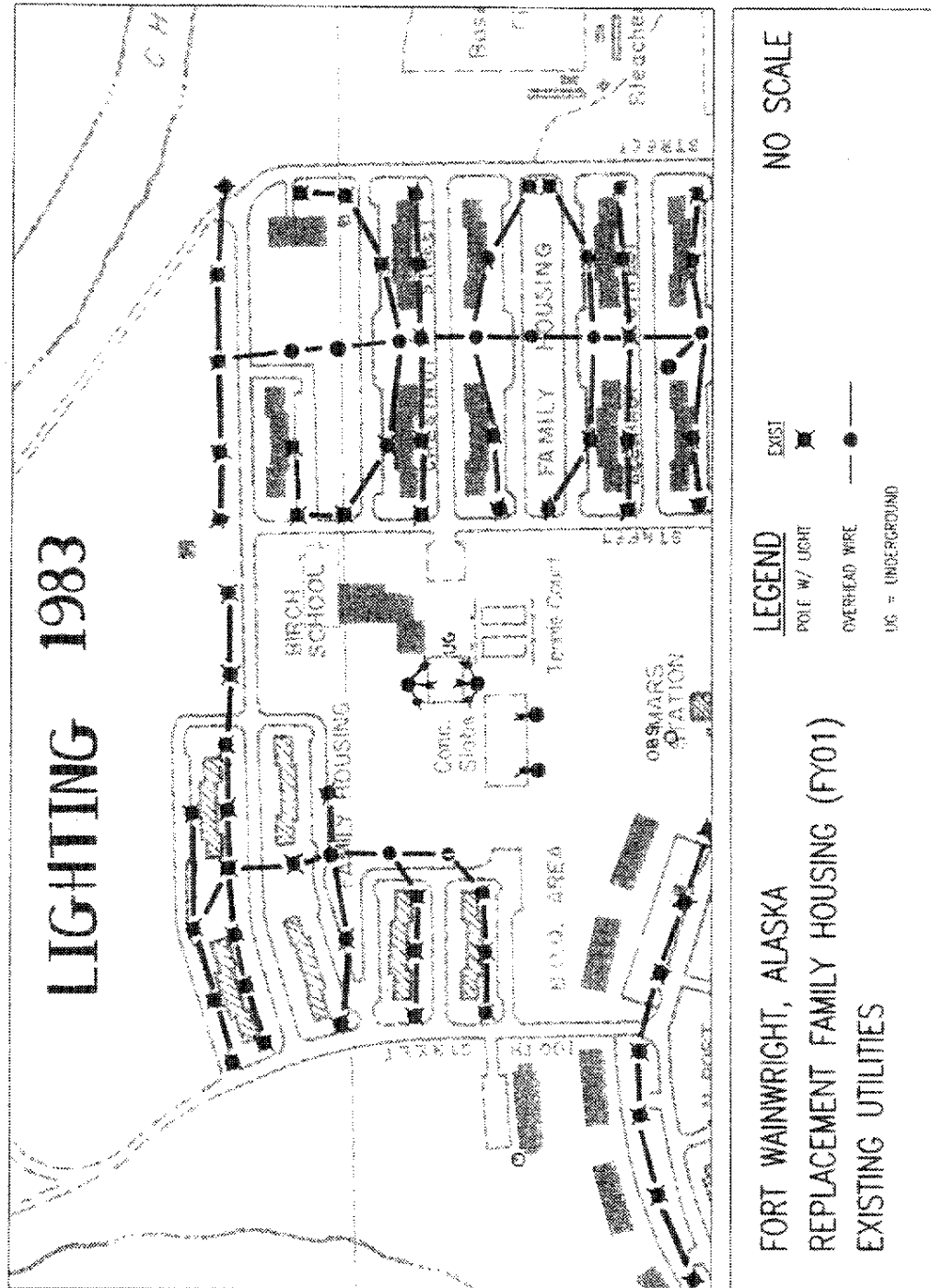
FORT WAINWRIGHT, ALASKA  
REPLACEMENT FAMILY HOUSING (FY01)  
EXISTING UTILITIES

**LEGEND**

PIPE SIZE (INCH)  
S = STEAM  
R = RETURN  
TR = TRACE

NO SCALE

UTLIDOR MANHOLE  
NUMBER



--End of Appendix 3--



**GEOTECHNICAL FINDINGS REPORT  
for the  
FAMILY HOUSING UPGRADE (FTW230)  
FT. WAINWRIGHT, ALASKA**

**March 2001**

**1. Introduction**

This geotechnical investigation was performed for the new Family Housing Upgrade at Fort Wainwright, Alaska.

The purpose of the exploration was to identify the subsurface and site conditions to assess geotechnical concerns. This report presents a summary of the findings based on results of laboratory tests, filed explorations, and general knowledge of the site.

**2. Project Description and Location**

It is our understanding the proposed project consist of removing the existing housing and replacing with new housing. Typical landscaping, pavements, and utilities are anticipated.

The site is located on Fort Wainwright, Alaska, near the Chena River. It is generally bounded to the north by 101<sup>st</sup> Airborne Drive, to the east by 102<sup>nd</sup> and 103<sup>rd</sup> Streets, and to the west by 100<sup>th</sup> Street. See enclosed Project Location and Vicinity Map (Figure 1).

**3. Field Exploration**

The subsurface exploration was conducted from January 19 to 31, 2001. Thirty test borings were drilled at the site consisting of twenty-three 7.6-meter (m) borings and seven 15.2-m borings.

The test borings were drilled with a tracked Acker Soilmax drill rig fitted with a continuous flight, 203-millimeter (mm) diameter, hollow stem auger. The Corps of Engineers, Alaska District drill crew performed the drilling. A geotechnical engineer with the Corps of Engineers supervised the drilling and logged the test borings in accordance with in accordance with ASTM D-2488, "Description and Identification of Soils (Visual - Manual Procedure)." A Corps chemist scanned the recovered samples for volatile organic compounds with a photo ionization detector (PID). PID readings are recorded on the exploration logs.

The test borings were originally sited in a rough uniform rectangular pattern over the site, but were re-sited at the request of the design build Architectural/Engineering firm (A/E). The A/E focused the field exploration to particular areas of interest. Surveyed boring locations are shown on the enclosed Test Boring Location Map (Figure 2).

Soil samples were procured at frequent intervals in the test borings, generally 1.5-m. Drive samples were taken with a 64-mm I.D., split spoon sampler driven with a 136-kilogram (kg) hammer falling 0.74-m. The sampler was driven 0.60-m ahead of the auger. The number of blows required to drive each 0.15-m is recorded on the exploration logs. The blow count is an indication of the relative density or consistency of the soil. Grab samples were procured near the surface in the test borings.

#### **4. Laboratory Testing**

A laboratory-testing program was established to determine the physical properties of the soils encountered. The test methods implemented for this program are listed below.

- ASTM D 422-63 (Re-approved 1990), "Standard Test Method for Particle Size Analysis of Soils".
- ASTM D 2216-92, "Laboratory Determination of Water (Moisture) Content of Soil and Rock".
- ASTM D 2487-93, "Classification of Soils for Engineering Purposes (Uniform Soil Classification System)".
- ASTM D 4318-93, "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils".
- TM 5-822-5/AFM 88-7 Chapter 1, "Pavement Design for Roads Streets, Walks, and Open Storage Areas", for determination of the frost classification of the soil.

Laboratory testing was also performed on soils within the project area to determine corrosivity characteristics. The test methods used for this analysis are listed below.

- SW 9045B - pH in Waste
- SW 9050 - Specific Conductance
- EPA 376.1 - Total Sulfides
- EPA 300.0 M - Anions by IC

The soil descriptions and classifications contained in this report and presented on the final test boring logs are the project engineer's interpretation of the field logs and results of the laboratory testing programs. The stratification lines represent approximate boundaries between soil types; the transitions are often gradual or not discernible by drill action. The final test boring logs are enclosed in Appendix A, the grain size distribution curves are enclosed in Appendix B, and the corrosivity testing results are enclosed in Appendix C of this report.

## **5. Regional Geology**

Ft. Wainwright is located approximately 4 kilometers (km) southeast of Fairbanks in the broad, level flood plain of the Tanana and Chena Rivers. The flood plain consists of deposits of sand and gravel to depths of a hundred meters and more overlying bedrock. Overlying these deposits is a layer of windblown silt and/or sandy silt from 1-m to 6-m in thickness.

Groundwater is generally encountered a few meters below the ground surface within the flood plain area. Discontinuous permafrost is present throughout the region.

Ft. Wainwright is located in seismic probability zone 3, which has been assigned a seismic coefficient "Z" value of 0.3 according to Department of the Army TM 5-809-10 (October 1992), "Seismic Design for Buildings." Zone 3 is considered a major damage zone.

## **6. Site Conditions**

### Current Land Use:

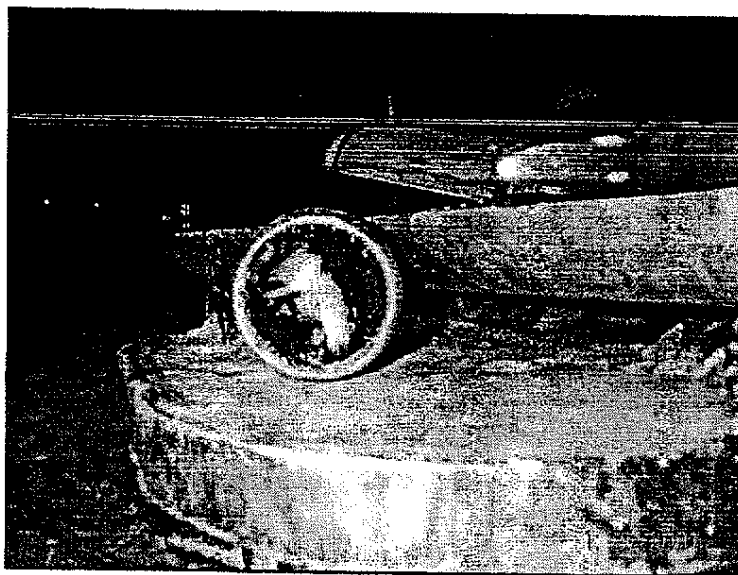
The site is currently used for military housing with paved roads, parking aprons, underground and overhead utilities, playgrounds, and other related improvements. Overhead and underground utilities consisting of power, water, sewer, and steam were observed on the site. Other utilities may also be present. Utility depths were not investigated as part of this project.

### Surface:

At the time of the investigation the site was generally covered with 0.3-m to 0.5-m of snow however, snow depths up to 1.2-m were found in several ground depressions where the snow had drifted. Topographically the site is planar with little relief. Site vegetation consists of grass, weeds, and trees.

Subsurface:

As expected from previous land use activities, the test borings indicate the surficial soils are made up of fill material. These soils are fine-grained and range in depths between 0.61-m to 4.72-m. These soils are predominately frost susceptible, with a frost classification of F4, and typically classifies as silt (ML) or silty sand (SM). Organics and debris including wood (Photo 1), glass, and metal fragments were encountered in this surficial layer. The depths in which organics and debris were encountered is shown in Table 1.



**Photo 1:** Wood debris encountered in the sampler shoe at a depth of 3.3-m in test boring AP-7938

The fill is underlain by brown to gray, frozen to wet, poor to well-graded sand (SP, SW) and poor to well-graded gravel (GP, GW) with localized zones of silty sand and gravel (SP-SM, SW-SM, GP-GM, GW-GM). Blow counts above the groundwater table indicate this material is relatively loose to medium dense.

The blow count and subsurface soil characteristics encountered for this project are consistent with the findings of other investigations in the area and also with the findings of a geologic evaluation performed in 1996 by Geomatrix Consultants. In this report, such soils were identified as being susceptible to liquefaction during seismic events. These soil conditions are also identified as being prone to liquefaction based upon criteria provided by Department of Army Technical Manual 5-818-1.



Table 1 Organic and Debris Materials Encountered			
Test Boring	Sample No.	Depth (m)	Material
AP-7930	2	1.7	Wood, metal
	3	3.2	Roots
AP-7931	1	Surface	Metal
	2	1.7	Metal, glass
	3	3.2	Wood, organics
AP-7932	2	1.7	Wood
	3	3.2	Wood
	4	4.7	Wood, metal
AP-7935	4	4.7	Organics
AP-7938	3	3.3	Wood

The groundwater table was encountered in all test borings. The groundwater table levels encountered "while drilling" were recorded in all but 6 test borings.

These 6 test borings were converted into temporary piezometers so that accurate and equilibrated ("after drilling") groundwater measurements could be obtained for the site. The results of the groundwater levels in these piezometers are shown in Table 2. As Table 2 indicates, the groundwater table elevations ranged between 132.69 and 133.05 on the site. The temporary piezometers consisted of 19-mm I.D. PVC pipe with handsaw cut slots. The piezometers were removed upon completion of the exploration. Groundwater levels can fluctuate seasonally with changes in precipitation, snowmelt, and runoff conditions. The depths at which the groundwater table was observed during and after drilling are presented on the exploration logs.

Table 2 Piezometer Groundwater Table Elevations	
Test Boring	Elevation (m)
AP-7916	132.69
AP-7919	132.77
AP-7925	132.79
AP-7932	133.05
AP-7938	132.84
AP-7942	132.76

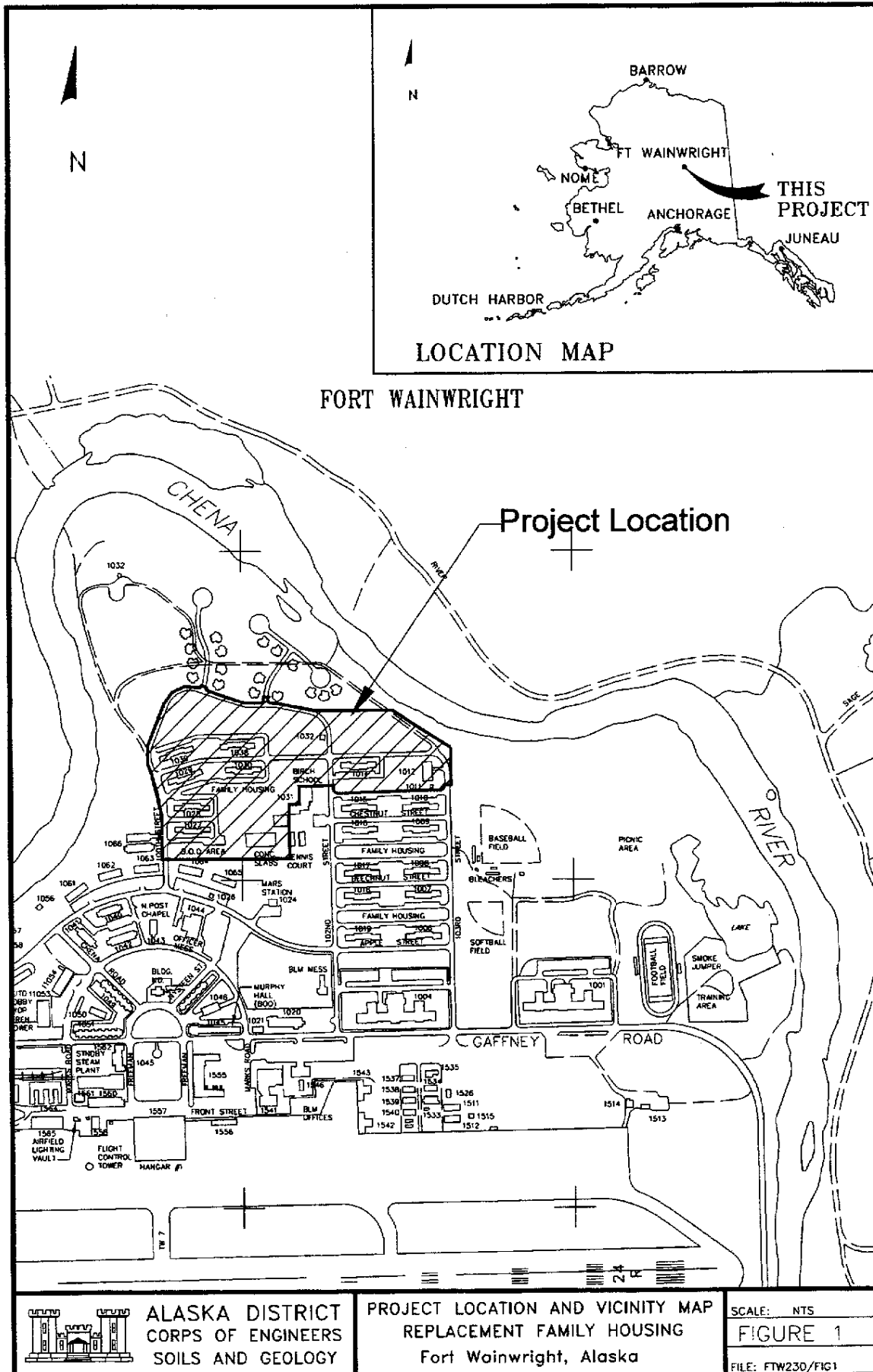
Seasonal, non-visible poorly bonded (Nf) to well bonded (Nbn) frozen soil was encountered in all the test borings. It was observed at depths ranging between 0.3-m to 0.5-m. However, under conditions of shallow or no snow cover (paved traffic areas), seasonal frost can penetrate to in excess of 2.4-m at the site during a cold winter.

#### Enclosures

1. Figure 1 - Project Location and Vicinity Map
2. Figure 2 - Test Boring Location Map
3. Appendix A - Exploration Logs, AP-7916 to AP-7945
4. Appendix B - Laboratory Results of Selected Soil Samples
5. Appendix C - Corrosivity Results of Selected Soil Samples

CORPS OF ENGINEERS

U.S. ARMY





REFERENCE FIGURE 2 SHEET 1 OF 1	TEST BORING LOCATION MAP REPLACEMENT FAMILY HOUSING FORT WAINWRIGHT, ALASKA	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ANCHORAGE, ALASKA	Date: 10/17/70 Drawn by: J. H. HARRIS Project: 100-100-100 Job Number: 100-100-100 Scale: 1:1000	SUBJECT NO. PROJECT NO. CITY STATE DISTRICT DISTRICT NAME
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**APPENDIX A**  
**EXPLORATION LOGS**  
**AP-7916 TO AP-7945**

ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES Soils and Geology Section <b>EXPLORATION LOG</b>										Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> Fort Wainwright, Alaska		Page 1 of 1 Date: 19 Jan 2001			
Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other					Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other					Location: Northing: 1,209,240 m Easting: 423,771 m				Top of Hole Elevation: 136.4 m	
Hole Number, Field: Permanent: AP-1 AP-7916					Driller: Bill Tester					Inspector: Mike Anderson					
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer					Depth to Groundwater: 3.75 m AD					Depth Drilled: 7.5 m		Total Depth: 8.1 m			
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit		Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive							
Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks	
								%Gravel	%Sand	%Fines					
1		1			4	ML	SILT with Sand				19.1	1.1		Brown, frozen to moist, fine sand, nonplastic (NP) fines, trace organics, fill	
2		2		F2	5 2 2	SM	Silty SAND	3	76	21	19.1	0.3	30	Dark brown, moist, fine to coarse sand, NP, fill, coal present in sample	
3		3			3 4 5 3	SP-SM	Poorly graded SAND with Silt					0.3		Dark brown, moist, fine to medium sand, NP fines, possibly fill	
4		4		F2	1 2 3	SM	Silty SAND	2	72	26	19.1	0.4	27	Blackish brown, wet, fine sand, NP fines, 10% organics by volume, organic odor, first 150 mm of spoon advanced under weight of hammer	
5															
6		5			4 10 14 16	GW	Well-graded GRAVEL with Sand				50.8	0.4		0.3 m of heaving sand Olive brown, wet, subangular to subrounded gravel, fine to coarse sand	
7															
8		6			10 13 14 13	GW	Well-graded GRAVEL with Sand				50.8	0.3		0.8 m of heaving sand Olive brown, wet, subangular to subrounded gravel, fine to coarse sand	
9														Bottom of Hole 8.1 m Elevation 128.3 m Groundwater Encountered After Drilling: at depth 3.75 m PID = (Hot) Photo Ionization Detector	
10															

EXPLORATION LOG FTW230 GP1 GEO LOG GDT 3/12/01

NPA Form 19-E May 94 Prev. Ed. Obsolete					Project: <b>FAMILY HOUSING UPGRADE - FTW230</b>					Hole Number: <b>AP-7916</b>				
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 <b>ALASKA DISTRICT</b> CORPS OF ENGINEERS ENGINEERING SERVICES <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <b>Fort Wainwright, Alaska</b>		Page 1 of 1 Date: <b>19 Jan 2001</b>										
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other										
Location: Northing: <b>1,209,181 m</b> Easting: <b>423,951 m</b>		Top of Hole Elevation: <b>136.9 m</b>												
Hole Number, Field: <b>AP-2</b> Permanent: <b>AP-7917</b>		Driller: <b>Bill Tester</b>		Inspector: <b>Mike Anderson</b>										
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>3.93 m WD</b>		Depth Drilled: <b>7.5 m</b> Total Depth: <b>8.1 m</b>										
Hammer Weight: <b>136 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>										
		Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>										
Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class. TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	NI	F4	Grab	ML	Sandy SILT	7	39	54	19.1	0.4	14	Brown, frozen, fine sand, nonplastic (NP) fines, trace organics, fill
2		2				SP	Poorly graded SAND					0.4		Brown, moist, subrounded gravel, fine sand
3		3		NFS	9 15 19 20	SP	Poorly graded SAND with Gravel	47	48	5	44.5	0.4	2	Brown, moist, subangular to subrounded gravel, fine and coarse sand
4		4			8 15 14 15	GW	Well-graded GRAVEL with Sand				50.8	0.4		Brownish orange, wet, subrounded gravel, fine to coarse sand
5		5			7 8 8 11	GW	Well-graded GRAVEL with Sand				50.8	0.4		150 mm of heaving sand Olive gray, wet, subangular to subrounded gravel, fine to coarse sand
6		6			12 11 11 6	GW	Well-graded GRAVEL with Sand				57.2	0.4		150 mm of heaving sand Olive gray, wet, subangular to subrounded gravel, fine to coarse sand
7														Bottom of Hole 8.1 m Elevation 128.8 m Groundwater Encountered While Drilling: at depth 3.93 m PID = (Hot) Photo Ionization Detector
8														
9														
10														

EXPLORATION LOG FTW230 GPJ GEO LOG GDT 3/12/01


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May 94 Prev. Ed. Obsolete


Project: **FAMILY HOUSING UPGRADE - FTW230**

Hole Number: **AP-7917**

 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b> <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <b>Fort Wainwright, Alaska</b>		Page 1 of 2 Date: <b>20 Jan 2001</b>									
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other									
Location: Northing: <b>1,209,147 m</b> Easting: <b>424,122 m</b>		Top of Hole Elevation: <b>137.6 m</b>											
Hole Number, Field: <b>AP-3</b> Permanent: <b>AP-7918</b>		Driller: <b>Bill Tester</b>		Inspector: <b>Mike Anderson</b>									
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>4.63 m WD</b>		Depth Drilled: <b>15.2 m</b> Total Depth: <b>15.8 m</b>									
Hammer Weight: <b>136 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>									
		Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>									
Depth (m)	Lithology	Sample	Frozen ASTM D 4083 Frost Class. TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PI (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
1		1	NI	Grab	ML	Sandy SILT				19.1	1.4		Brown, frozen to moist, subrounded gravel, fine sand, nonplastic (NP) fines, trace organics, fill
2		2		5 4 3 4	SP	Poorly graded SAND					0.4		Brown, moist, fine to medium sand, NP fines, possibly fill
3		3		3 14 14 16	SP	Poorly graded SAND with Gravel				50.8	0.2		Brown, moist, subangular to subrounded gravel, fine and coarse sand
4		4		11 14 12 11	GW	Well-graded GRAVEL with Sand				50.8	0.2		Brown, wet, subangular to subrounded gravel, fine to coarse sand, some fractured gravel by driving
5		5		4 8 3 4	GW	Well-graded GRAVEL with Sand				44.5	0.2		Olive gray, wet, subangular to subrounded gravel, fine to coarse sand, trace organics (wood)
6		6	PFS	20 14 9 6	GP	Poorly graded GRAVEL with Sand	53	43	4	76.2	0.4		1.2 m of heaving sand Olive gray, wet, subangular to subrounded gravel, fine to coarse sand
7		7		10 12 7 6	GW	Well-graded GRAVEL with Sand				44.5	0.5		0.3 m of heaving sand Olive gray, wet, subrounded gravel, fine to coarse sand, 1 foot of heaving sand
NPA Form 19-E May 94 Prev. Ed. Obsolete						Project: <b>FAMILY HOUSING UPGRADE - FTW230</b>						Hole Number: <b>AP-7918</b>	



 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> Fort Wainwright, Alaska		Page 2 of 2 Date: 20 Jan 2001	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
<b>Soils and Geology Section EXPLORATION LOG</b>		Location: Northing: 1,209,147 m Easting: 424,122 m		Top of Hole Elevation: 137.6 m	
		Hole Number, Field: Permanent AP-3 AP-7918		Driller: <b>BIII Tester</b> Inspector: <b>Mike Anderson</b>	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: 4.63 m WD		Depth Drilled: 15.2 m Total Depth: 15.8 m	
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit	
		Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive	


Depth (m)	Lithology	Sample	Frost Class: TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
11		8		13 15 17 18	GW	Well-graded GRAVEL with Sand				57.2	0.2	0.3 m of heaving sand  Olive gray, wet, subangular to subrounded gravel, fine to coarse sand, some fractured gravel	
12		9		6 7 11 9	SW	Well-graded SAND with Gravel				25.4	0.2	Olive gray, wet, subangular to subrounded gravel, fine to coarse sand	
13		10		10 14 20 31	SW	Well-graded SAND with Gravel				38.1	0.3	0.6 m of heaving sand  Olive gray, wet, subangular to subrounded gravel, fine to coarse sand	
16												Bottom of Hole 15.8 m Elevation 121.7 m Groundwater Encountered While Drilling: at depth 4.63 m PID = (Hot) Photo Ionization Detector	
17													
18													
19													
20													

EXPLORATION LOG (FTW230 GPJ) GEO. LOG GDT 3/12/01

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Project: **FAMILY HOUSING UPGRADE - FTW230**

Hole Number:  
**AP-7918**


 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b>		Page 1 of 2	
		Fort Walnwright, Alaska		Date: 21 Jan 2001	
<b>Soils and Geology Section EXPLORATION LOG</b>		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
		Location: Northing: 1,209,094 m Easting: 424,210 m		Top of Hole Elevation: 137.8 m	
Hole Number, Field: Permanent: AP-4 AP-7919		Driller: Bill Tester		Inspector: Mike Anderson	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: 5.06 m AD		Depth Drilled: 15.1 m	
Total Depth: 15.7 m					
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit	
Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive			


Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PIU (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	NT		Grab	ML	SILT with Sand					1.2		Brown, frozen, fine sand, nonplastic (NP) fines, fill
2		2			6 6 4	SP-SM	Poorly graded SAND with Silt					0.6		Brown, moist, fine sand, NP fines, some orange staining, possibly fill
3		3		NFS	3 2 3 5	SP-SM	Poorly graded SAND with Silt	13	80	7	25.4	0.3	4	Brown, moist, fine sand
4		4			6 9 9 8	SP	Poorly graded SAND				38.1	0.4		Brown, moist to wet, fine to medium sand
5														
6		5			3 11 22 8	SP	Poorly graded SAND with Gravel				38.1	0.3		Brown, wet, subangular to subrounded gravel, fine to coarse sand
7														
8		6			5 17 16 12	GW	Well-graded GRAVEL with Sand				44.5	0.3		0.5 m of heaving sand Olive gray, wet, subangular to subrounded gravel, fine to coarse sand
9														
10		7			6 8 9 10	GW	Well-graded GRAVEL with Sand				63.5	0.4		0.5 m of heaving sand Olive gray, wet, subangular to subrounded gravel, fine to coarse sand

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May 94 Prev. Ed. Obsolete

Project: **FAMILY HOUSING UPGRADE - FTW230**

Hole Number:  
**AP-7919**


 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b>  <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <i>Fort Wainwright, Alaska</i>		Page 2 of 2	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
		Location: Northing: 1,209,094 m Easting: 424,210 m		Top of Hole Elevation: 137.8 m	
Hole Number, Field: <b>AP-4</b>		Permanent: <b>AP-7919</b>		Driller: <b>Bill Tester</b>	
Inspector: <b>Mike Anderson</b>					
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer			Depth to Groundwater: 5.06 m AD		Depth Drilled: 15.1 m
Total Depth: 15.7 m					
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit	
Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive			

Depth (m)	Lithology	Sample	Frost Class. ASTM D 4083 TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
11		8		8 7 13	GW	Well-graded GRAVEL with Sand				50.8	0.2	1.1 m of heaving sand  Olive gray, wet subangular to subrounded gravel, fine to coarse sand, some fractured gravel	
12		9		6 6 9	SP	Poorly graded SAND with Gravel				38.1	0.3	0.6 m of heaving sand  Olive brown, wet, subangular to subrounded gravel, fine to coarse sand, some fractured gravel	
13													
14													
15		10		26 26 24 22	GW	Well-graded GRAVEL with Sand				50.8	0.2	0.6 m of heaving sand  Olive green, wet, subangular to subrounded gravel, fine to coarse sand, some fractured gravel	
16												Bottom of Hole 15.7 m Elevation 122.1 m Groundwater Encountered After Drilling: at depth 5.06 m PID = (Hot) Photo Ionization Detector	
17													
18													
19													
20													

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Project:  
**FAMILY HOUSING UPGRADE - FTW230**

Hole Number:  
**AP-7919**


 <b>ALASKA DISTRICT</b> CORPS OF ENGINEERS ENGINEERING SERVICES <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <i>Fort Wainwright, Alaska</i>		Page 1 of 1	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
Hole Number, Field: <b>AP-5</b>		Permanent: <b>AP-7920</b>		Driller: <b>Bill Tester</b>	
Inspector: <b>Steve Henslee</b>		Location: Northing: <b>1,209,089 m</b> Easting: <b>424,157 m</b>		Top of Hole Elevation: <b>137.9 m</b>	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>5.18 m WD</b>		Depth Drilled: <b>7.5 m</b>	
Total Depth: <b>8.1 m</b>		Hammer Weight: <b>136 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>	
Size and Type of Bit: <b>203.2 mm Rock Bit</b>		Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>	

Depth (m)	Lithology	Sample	Frost Class: ASTM D 4083 TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
1		1	Nbn	Grab	SM	Silty SAND					0.8		Brown, frozen to moist, fine sand, nonplastic (NP) fines, possibly fill
2		2	F4	2 2 3	ML	SILT with Sand	6	14	80	38.1	0.4	26	Brown, moist, fine sand, NP, possibly fill
3		3	PFS	15 23 21 19	GW-GM	Well-graded GRAVEL with Silt and Sand	53	40	7	50.8	0.4	2	Brown, moist, rounded gravel, fine and coarse sand
4		4		10 10 8 10	SP	Poorly graded SAND					0.5		Brown, moist, medium sand
5		5	PFS	6 7 6 7	GW	Well-graded GRAVEL with Sand	55	41	4	50.8	0.3		Gray, wet, subrounded gravel, fine to coarse sand
6		6		15 20 25 25	GP	Poorly graded GRAVEL with Sand				19.1	0.3		0.6 m of heaving sand Gray, wet, subrounded gravel, fine to coarse sand
7													
8													Bottom of Hole 8.1 m Elevation 129.9 m Groundwater Encountered While Drilling: at depth 5.18 m PID = (Hot) Photo Ionization Detector
9													
10													

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Project: **FAMILY HOUSING UPGRADE - FTW230**


Hole Number: **AP-7920**

 <b>ALASKA DISTRICT</b> CORPS OF ENGINEERS ENGINEERING SERVICES <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <b>Fort Wainwright, Alaska</b>		Page 1 of 1										
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other										
Hole Number, Field: <b>AP-6</b> Permanent: <b>AP-7921</b>		Location: Northing: <b>1,209,080 m</b> Easting: <b>424,076 m</b>		Top of Hole Elevation: <b>137.8 m</b>										
Driller: <b>Bill Tester</b>		Inspector: <b>Steve Henslee</b>												
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>4.95 m WD</b>		Depth Drilled: <b>7.5 m</b> Total Depth: <b>8.1 m</b>										
Hammer Weight: <b>136 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>										
Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>												
Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class TM 5-822.5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	Nbn		Grab	ML	SILT					0.4		Brown, frozen to moist, fine sand, nonplastic (NP) fines, possibly fill
2		2		F4	2 3 4	ML	SILT with Sand	23	77		0.3	21		Brown, moist, fine sand, NP fines, possibly fill
3		3		PFS	15 18 20 25	GP- GM	Poorly graded GRAVEL with Silt and Sand	44	45	6	38.1	0.4	2	Tan, moist, subrounded gravel, fine and coarse sand
4		4			6 9 3	SW	Well-graded SAND with Gravel				25.4	0.4		Gray, moist to wet (bottom 203 mm of sample), subrounded gravel, fine to coarse sand, NP fines
5		5			7 4 4 4	SP	Poorly graded SAND with Gravel				38.1	0.4		0.6 m of heaving sand Gray, wet, subrounded gravel, medium to coarse sand
6		6			7 3 5 A	SP	Poorly graded SAND				12.7	0.4		1.2 m of heaving sand Gray, wet, subrounded gravel, medium to coarse sand
7														
8														Bottom of Hole 8.1 m Elevation 129.8 m Groundwater Encountered While Drilling: at depth 4.95 m PID = (Hot) Photo Ionization Detector
9														
10														

EXPLORATION LOG FTW230 GPJ GEO LOG GDT 3/12/01

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**FAMILY HOUSING UPGRADE - FTW230**Hole Number:  
**AP-7921**




 <b>ALASKA DISTRICT</b> CORPS OF ENGINEERS ENGINEERING SERVICES										Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> Fort Wainwright, Alaska				Page 1 of 1 Date: 22 Jan 2001	
<b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>										Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other			Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other		
										Location: Northing: 1,209,089 m Easting: 424,047 m			Top of Hole Elevation: 138.1 m		
Hole Number, Field: <b>AP-7</b>				Permanent: <b>AP-7922</b>				Driller: <b>Bill Tester</b>			Inspector: <b>Steve Henslee</b>				
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer				Depth to Groundwater: 5.09 m WD				Depth Drilled: 7.5 m		Total Depth: 8.1 m					
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit		Type of Equipment: Acker Soil Max			Type of Samples: Grab and Drive						
Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class. TM 5-822.5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks	
								%Gravel	%Sand	%Fines					
1		1	Nbn		Grab	SM	Silty SAND with Gravel				6.4	1.0		Brown, frozen to moist, subrounded gravel, fine and coarse sand, nonplastic (NP) fines, POSSIBLE FILL	
2		2		F4	9 9 7	ML	Sandy SILT		42	58		0.4	15	Brown, moist, fine sand, NP fines, possibly fill	
2		2a			6	SP	Poorly graded SAND							Gray, moist, medium sand	
3		3		NFS	20 27 34 39	GP- GM	Poorly graded GRAVEL with Silt and Sand	53	41	6	38.1	0.4	2	Tan, moist, subrounded gravel, fine and coarse sand	
4		4			4 2 3 4	SP	Poorly graded SAND				0.0	0.5		Gray, moist, medium sand	
5		5			2 2 3 5	SP	Poorly graded SAND				25.4	0.4		1.2 m of heaving sand Gray, wet, subrounded gravel, medium sand	
7		6			6 8 10 8	SW	Well-graded SAND with Gravel				12.7	0.4		0.6 m of heaving sand Gray, wet, subrounded gravel, fine to coarse sand	
8														Bottom of Hole 8.1 m Elevation 130.0 m Groundwater Encountered While Drilling: at depth 5.09 m PID = (Hot) Photo Ionization Detector	
9															
10															

EXPLORATION LOG FTW230 GPJ GEO LOG GDT 3/12/01

NPA Form 19-E May 94 Prev. Ed. Obsolete				Project: <b>FAMILY HOUSING UPGRADE - FTW230</b>				Hole Number: <b>AP-7922</b>			
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ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES		Project: FAMILY HOUSING UPGRADE - FTW230 Fort Walnwright, Alaska		Page 1 of 1 Date: 22 Jan 2001										
Soils and Geology Section EXPLORATION LOG		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other										
Hole Number, Field: AP-8 Permanent: AP-7923		Driller: Bill Tester		Inspector: Steve Henslee										
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: 5.03 m WD		Depth Drilled: 7.5 m Total Depth: 8.1 m										
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit										
Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive												
Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class, TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	Nbn		Grab	ML	SILT with Sand				50.8	2.6		Brown, frozen to moist, fine to coarse sand, nonplastic (NP) fines, possibly fill
2		2		F2	5 4 3 3	SM	Silty SAND with Gravel	20	32	48	38.1	0.5	9	Brown, moist, fine sand, NP fines, possibly fill
3		3		PFS	8 11 10 9	GW- GM	Well-graded GRAVEL with Silt and Sand	55	37	8	50.8	0.6	2	Brown, moist, subrounded gravel, fine and coarse sand
4		4			9 14 21 25	SP	Poorly graded SAND				38.1	0.6		Brown, moist, subrounded gravel, medium to coarse sand
5		5			13 18 17 21	GP	Poorly graded GRAVEL with Sand				6.4	0.3		Gray, wet, subrounded gravel, fine to coarse sand
6		6			22 25 32 23	GP	Poorly graded GRAVEL with Sand				6.4	0.3		Gray, wet, subrounded gravel, fine to coarse sand, NP fines
7														
8														
9														Bottom of Hole 8.1 m Elevation 129.8 m Groundwater Encountered While Drilling: at depth 5.03 m PID = (Hot) Photo Ionization Detector
10														

 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b> <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <b>Fort Walnwright, Alaska</b>		Page 1 of 2 Date: <b>23 Jan 2001</b>	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
Location: Northing: <b>1,209,093 m</b> Easting: <b>423,984 m</b>		Top of Hole Elevation: <b>138.2 m</b>			
Hole Number, Field: <b>AP-9</b>		Permanent: <b>AP-7924</b>		Driller: <b>Bill Tester</b> Inspector: <b>Steve Henslee</b>	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>5.33 m WD</b>		Depth Drilled: <b>12.2 m</b> Total Depth: <b>12.2 m</b>	
Hammer Weight: <b>136 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>	
		Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>	


Depth (m)	Lithology	Sample	Frost Class: TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
1		1	Nbn	9	ML	SILT					0.3		Brown, frozen to moist, subangular gravel, fine to medium sand, nonplastic (NP) fines, possibly fill
2		2		10	SM	Silty SAND					0.3		Brown, moist, fine sand, NP fines, possibly fill
3		3	F4	3	ML	Sandy SILT	5	27	68	19.1	0.4	19	Brown, moist, fine sand, NP fines, possibly fill
4		4		9	SP	Poorly graded SAND with Gravel				19.1	0.3		Gray, moist, fine subrounded gravel, fine sand, NP fines
5		5		7	GP	Poorly graded GRAVEL with Sand				19.1	0.3		Brown, wet, subrounded gravel, fine to coarse sand
6		6		6	SW	Well-graded SAND with Gravel				25.4	0.4		Gray, wet, fine subrounded gravel, fine to coarse sand
7		7		11									Spoon damaged during advancement, no sample recovery.

EXPLORATION LOG FTW230 GP1 GEO LOG GDI 3/12/01


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Project: **FAMILY HOUSING UPGRADE - FTW230**

Hole Number: **AP-7924**

 <b>ALASKA DISTRICT</b> <b>CORPS OF ENGINEERS</b> <b>ENGINEERING SERVICES</b>  <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b>		Page 2 of 2										
		Fort Wainwright, Alaska		Date: 23 Jan 2001										
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other										
Hole Number, Field: <b>AP-9</b> Permanent: <b>AP-7924</b>		Driller: <b>Bill Tester</b>		Inspector: <b>Steve Henslee</b>										
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>5.33 m WD</b>		Depth Drilled: <b>12.2 m</b> Total Depth: <b>12.2 m</b>										
Hammer Weight: <b>136 kg</b> Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>		Type of Equipment: <b>Acker Soil Max</b> Type of Samples: <b>Grab and Drive</b>										
Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class: TM 5-622-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
11														Spoon damaged during advancement, sample not recovered, drilled to 12.2 m for next sample, unable to overcome heave
12														
13														Bottom of Hole 12.2 m Elevation 126.0 m Groundwater Encountered While Drilling: at depth 5.33 m PID = (Hot) Photo Ionization Detector
14														
15														
16														
17														
18														
19														
20														

EXPLORATION LOG 30 GPJ GEO LOG GDT 3/12/01

 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b> <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <i>Fort Wainwright, Alaska</i>		Page 1 of 1	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
Location: Northing: 1,209,177 m Easting: 423,998 m		Top of Hole Elevation: 137.0 m			
Hole Number, Field: <b>AP-10</b>		Permanent: <b>AP-7925</b>		Driller: <b>Bill Tester</b>	
Inspector: <b>Steve Henslee</b>		Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>4.17 m AD</b>	
Depth Drilled: <b>7.5 m</b>		Total Depth: <b>8.1 m</b>			
Hammer Weight: <b>135 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>	
Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>			

Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	Nbn		Grab	ML	SILT with Sand							Brown, frozen to moist, fine sand, nonplastic (NP) fines, possibly fill
2		2		F4	3 3 4 3	ML	Sandy SILT		33	67			24	Brown, moist, fine sand, NP fines, possibly fill
3		3		NFS	6 10 7 9	GP	Poorly graded GRAVEL with Sand	50	48	2	25.4		2	Brown, moist, subrounded gravel, fine and coarse sand
4		4			10 12 13 15	GP	Poorly graded GRAVEL with Sand				6.4			Brown, wet, subrounded gravel, fine to coarse sand
5		5			13 10 7 9	GW	Well-graded GRAVEL with Sand				31.8			Brown, wet, subrounded gravel, fine to coarse sand
6		6			10 12 8 11	GP	Poorly graded GRAVEL with Sand				19.1			Gray, wet, subrounded gravel, fine to coarse sand
7														
8														Bottom of Hole 8.1 m Elevation 128.9 m Groundwater Encountered After Drilling: at depth 4.17 m
9														
10														

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Project: **FAMILY HOUSING UPGRADE - FTW230**

Hole Number: **AP-7925**



ALASKA DISTRICT  
CORPS OF ENGINEERS  
ENGINEERING SERVICESSoils and Geology Section  
**EXPLORATION LOG**Project: **FAMILY HOUSING UPGRADE - FTW230**  
Fort Wainwright, Alaska

Page 1 of 1

Date: 24 Jan 2001

Drilling Agency: ☒ Alaska District  
☐ OtherElevation Datum:  
☒ MSL ☐ otherLocation: Northing: 1,209,150 m  
Easting: 423,928 mTop of Hole  
Elevation: 137.9 mHole Number, Field: Permanent:  
AP-11 AP-7926Driller:  
Bill TesterInspector:  
Steve HensleeType of Hole: ☐ other☐ Test Pit ☒ Auger Hole ☐ Monitoring Well ☐ PiezometerDepth to Groundwater:  
5.03 m WDDepth Drilled:  
7.3 mTotal Depth:  
7.9 mHammer Weight:  
136 kgSplit Spoon I.D.:  
63.5 mmSize and Type of Bit:  
203.2 mm Rock BitType of Equipment:  
Acker Soil MaxType of Samples:  
Grab and Drive

Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	Nbn		Grab	SM	Silty SAND					0.6		Brown, frozen to moist, fine sand, nonplastic (NP) fines, possibly fill
2		2		F4	2 3 4	ML	Sandy SILT		33	67		0.9	15	Brown, moist, fine sand, NP fines, possibly fill
3		3		NFS	8 9 12 11	GP- GM	Poorly graded GRAVEL with Silt and Sand	61	34	5	50.8	0.9	1	Brown, moist, subrounded gravel, fine and coarse sand
4		4			7 14 18 17	GP	Poorly graded GRAVEL with Sand				19.1	1.1		Brown, moist, subrounded gravel, fine to coarse sand, NP fines
5														
6		5			9 11 10 8	GP	Poorly graded GRAVEL with Sand				38.1			Brown, wet, subrounded gravel, medium to coarse sand
7				NFS	9 10 11 12	GP	Poorly graded GRAVEL with Sand	63	33	4	50.8		7	0.3 m of heaving sand
8		6												Gray, wet, fine subrounded gravel, fine to coarse sand
9														Bottom of Hole 7.9 m Elevation 130.0 m Groundwater Encountered While Drilling: at depth 5.03 m PID = (Hot) Photo Ionization Detector
10														

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FAMILY HOUSING UPGRADE - FTW230Hole Number:  
AP-7926


ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES		Project: FAMILY HOUSING UPGRADE - FTW230 Fort Wainwright, Alaska		Page 1 of 1 Date: 24 Jan 2001								
Soils and Geology Section EXPLORATION LOG		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other								
Hole Number, Field: AP-12 Permanent: AP-7927		Location: Northing: 1,209,033 m Easting: 423,949 m		Top of Hole Elevation: 137.9 m								
Driller: Bill Tester		Inspector: Steve Henslee										
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: 5.33 m WD		Depth Drilled: 7.5 m Total Depth: 8.1 m								
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit								
Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive										
Depth (m)	Lithology	Sample	Frozen ASTM D 4083 TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size (mm)			PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines			
1		1	Nbn	Grab	SM	Silty SAND with Gravel				1.6		Brown, frozen to moist, subrounded gravel, fine sand, nonplastic (NP) fines, possibly fill
2		2		4 4 5 5	ML	SILT with Sand				0.7		Brown, moist, fine sand, NP fines, possibly fill
3		3a 3b	F4	4 4 3 3	ML SP	Sandy SILT Poorly graded SAND	45	55		0.6	11	Brown, moist, fine sand, NP fines, possibly fill Tan, moist, medium sand
4		4	S2	1 3 4 6	SM	Silty SAND	74	26		33		Mottled brown and dark gray, wet, fine sand, NP fines, faint sewage odor present
5		5		1 1 1 1	SP	Poorly graded SAND						Gray, wet, fine sand
6		6		1 3 4 7	SP	Poorly graded SAND						Dark gray, wet, fine to medium sand
7												
8												
9												
10												
Bottom of Hole 8.1 m Elevation 129.8 m Groundwater Encountered While Drilling: at depth 5.33 m PID = (Hot) Photo Ionization Detector												

EXPLORATION LOG FTW230 GPJ GEO LOG GDT 3/12/01

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Project: FAMILY HOUSING UPGRADE - FTW230

Hole Number: AP-7927

 <b>ALASKA DISTRICT</b> CORPS OF ENGINEERS ENGINEERING SERVICES <b>Soils and Geology Section</b> <b>EXPLORATION LOG</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> Fort Wainwright, Alaska		Page 1 of 1	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
Hole Number, Field: <b>AP-13</b>		Permanent: <b>AP-7928</b>		Driller: <b>Bill Tester</b>	
Inspector: <b>Steve Henslee</b>		Location: Northing: <b>1,209,142 m</b> Easting: <b>424,047 m</b>		Top of Hole Elevation: <b>137.9 m</b>	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: <b>5.03 m WD</b>		Depth Drilled: <b>7.5 m</b> Total Depth: <b>8.1 m</b>	
Hammer Weight: <b>136 kg</b>		Split Spoon I.D.: <b>63.5 mm</b>		Size and Type of Bit: <b>203.2 mm Rock Bit</b>	
Type of Equipment: <b>Acker Soil Max</b>		Type of Samples: <b>Grab and Drive</b>			

Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class. TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	Nbn		6	ML	SILT with Sand							Dark brown, frozen to moist, fine sand, nonplastic (NP) fines, possibly fill
2		2			6	SM	Silty SAND					0.6		Brown, moist, fine sand, NP fines, possibly fill
3		3		S2	2	SM	Silty SAND with Gravel	34	47	19	38.1	0.4	20	Brown, moist, subrounded gravel, fine sand, NP fines
4		4			12	SP	Poorly graded SAND with Gravel				44.5	0.2		Brown, moist, subrounded gravel, medium sand
5					15									
6		5		PFS	7	GW	Well-graded GRAVEL with Sand	61	35	4	50.8	3.2	7	Brown, wet, subrounded gravel, fine to coarse sand
7					10									
8		6			14	GP	Poorly graded GRAVEL with Sand				57.2	2.8		Gray, wet, subrounded gravel, fine to coarse sand
9					17									
10					18									
														Bottom of Hole 8.1 m Elevation 129.9 m Groundwater Encountered While Drilling: at depth 5.03 m PID = (Hot) Photo Ionization Detector

EXPLORATION LOG - FTW230 GPJ GEO LOG GDT 3/12/01

 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <i>Fort Wainwright, Alaska</i>		Page 1 of 1	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
<b>Soils and Geology Section EXPLORATION LOG</b>		Location: Northing: 1,209,170 m Easting: 424,084 m		Top of Hole Elevation: 137.7 m	
		Hole Number, Field: Permanent: AP-14 AP-7929		Driller: <i>Bill Tester</i> Inspector: <i>Steve Henslee</i>	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: 5.64 m WD		Depth Drilled: 7.5 m	
Total Depth: 8.1 m					
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit	
Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive			

Depth (m)	Lithology	Sample	Frost Class: TM 5-822.5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
1		1	Nbn	Grab	ML	SILT					5.8		Dark brown, frozen to moist, fine sand, nonplastic (NP) fines, possibly fill
2		2	F2	3 3 3	SM	Silty SAND	2	57	41	19.1	3.2	11	Brown, moist, fine sand, NP fines, possibly fill
3		3a		4	ML	SILT					3.8		Dark gray to black, moist, NP fines, humus odor, possibly fill
3		3b	NFS	7 10 10	SW-SM	Well-graded SAND with Silt and Gravel	29	61	10	38.1		4	Brown, subrounded gravel, fine to coarse sand
4		4		12 14 13 15	GP	Poorly graded GRAVEL with Sand				44.5	6.4		Brown, moist, subrounded gravel, fine to coarse sand
5		5		11 13 12 7	GP	Poorly graded GRAVEL with Sand				38.1	0.6		Gray, wet, subrounded gravel, fine to coarse sand
6		6		17 14 15 18	SW	Well-graded SAND with Gravel					0.6		1.5 m of heaving sand Dark gray, wet, fine subrounded gravel, fine to coarse sand, faint organic odor Dark gray, wet, subrounded gravel, fine to coarse sand, humus odor Bottom of Hole 8.1 m Elevation 129.7 m Groundwater Encountered While Drilling: at depth 5.64 m PID = (Hot) Photo Ionization Detector
7													
8													
9													
10													

EXPLORATION LOG FTW230 GPJ GEO LOG GDT 3/12/01


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Project:  
**FAMILY HOUSING UPGRADE - FTW230**

Hole Number:  
**AP-7929**

ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES			Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> <b>Fort Wainwright, Alaska</b>		Page 1 of 1 Date: 25 Jan 2001								
Soils and Geology Section <b>EXPLORATION LOG</b>			Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other								
			Location: Northing: 1,209,166 m Easting: 424,145 m		Top of Hole Elevation: 137.1 m								
Hole Number, Field: Permanent: AP-15 AP-7930			Driller: Bill Tester		Inspector: Steve Henslee								
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer			Depth to Groundwater: 4.18 m WD		Depth Drilled: 7.5 m Total Depth: 8.1 m								
Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm		Size and Type of Bit: 203.2 mm Rock Bit		Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive					
Depth (m)	Lithology	Sample	Frozen ASTM D 4083 Frost Class. TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
							%Gravel	%Sand	%Fines				
1		1	Nbn	Grab	ML	SILT					0.8		Black, frozen to moist, coarse sand, nonplastic (NP) fines, possibly fill
2		2	F2	2 1 4	SM	Silty SAND with Organics	23	54	23	38.1	0.6	22	Black, moist, fine to coarse sand, NP fines, wood, metal debris, driller advanced from 0.61m to 1.37 m feet using hydraulics only, possibly fill
3		3	F2	3 3 5	SM	Silty SAND with Gravel	27	52	21	38.1	0.4	28	Black, moist, fine subrounded gravel, medium to coarse sand, NP fines, some organics present (roots), possibly fill
4		4		9 13 14 12	GP	Poorly graded GRAVEL with Sand				50.8	1.6		Gray, wet, subrounded gravel, fine to coarse sand
5													
6		5		9 12 13 11	SW	Well-graded SAND with Gravel				25.4	0.5		Gray, wet, subrounded gravel, fine to medium sand
7													
8		6		4 4 5	GP	Poorly graded GRAVEL with Sand				31.8	0.5		Gray, wet, subrounded gravel, medium to coarse sand
9													Bottom of Hole 8.1 m Elevation 129.0 m Groundwater Encountered While Drilling: at depth 4.18 m PID = (Hot) Photo Ionization Detector
10													



 <b>ALASKA DISTRICT CORPS OF ENGINEERS ENGINEERING SERVICES</b>		Project: <b>FAMILY HOUSING UPGRADE - FTW230</b> Fort Wainwright, Alaska		Page 1 of 1	
		Drilling Agency: <input checked="" type="checkbox"/> Alaska District <input type="checkbox"/> Other		Elevation Datum: <input checked="" type="checkbox"/> MSL <input type="checkbox"/> other	
Soils and Geology Section <b>EXPLORATION LOG</b>		Location: Northing: 1,209,163 m Easting: 424,215 m		Top of Hole Elevation: 136.0 m	
Hole Number, Field: AP-16 Permanent: AP-7931		Driller: Bill Tester		Inspector: Steve Henslee	
Type of Hole: <input type="checkbox"/> other <input type="checkbox"/> Test Pit <input checked="" type="checkbox"/> Auger Hole <input type="checkbox"/> Monitoring Well <input type="checkbox"/> Piezometer		Depth to Groundwater: 4.02 m WD		Depth Drilled: 7.5 m	
Total Depth: 8.1 m		Hammer Weight: 136 kg		Split Spoon I.D.: 63.5 mm	
Size and Type of Bit: 203.2 mm Rock Bit		Type of Equipment: Acker Soil Max		Type of Samples: Grab and Drive	

Depth (m)	Lithology	Sample	Frozen ASTM D 4083	Frost Class: TM 5-822-5	Blow Count	Symbol	Classification ASTM: D 2487 or D 2488	Grain Size			Max Size (mm)	PID (ppm)	% Water	Description and Remarks
								%Gravel	%Sand	%Fines				
1		1	Nbn		Grab	ML	SILT					0.5		Brown, frozen to moist, fine sand, nonplastic (NP) fines, metallic debris with rust, fill
2		2		F2	2 3 3	SM	Silty SAND	6	48	46	25.4	0.4	12	Brown, moist, fine sand, NP fines, rusted metallic and glass debris, fill
3		3		F2	2 2 2	SM	Silty SAND	1	54	45	19.1	0.5	26	Brown, moist, fine sand, NP fines, trace of wood and plant debris, fill
4		4			8 9 10 10	SW	Well-graded SAND with Gravel				12.7	0.5		Gray, wet, subrounded gravel, fine to coarse sand
5		5			5 5 6 9	SW	Well-graded SAND with Gravel				25.4	0.5		Gray, wet, subrounded gravel, fine to coarse sand
6		6			6 9 8 10	SW	Well-graded SAND with Gravel				31.8	0.5		1.2 m of heaving soils
7														Gray, wet, subrounded gravel, fine to coarse sand
8														Bottom of Hole 8.1 m Elevation 127.9 m Groundwater Encountered While Drilling: at depth 4.02 m PID = (Hot) Photo Ionization Detector
9														
10														

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Project:  
**FAMILY HOUSING UPGRADE - FTW230**

Hole Number:  
**AP-7931**